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## A NEW AMIOID FISH FROM THE UPPER CRETACEOUS OF KANSAS

DAVID H. DUNKLE

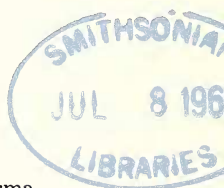
### ABSTRACT

The partial skeleton of a small fish from the Niobrara Formation (Upper Cretaceous) of Kansas possesses a hemiheterocercal caudal fin, scales of rounded amioid type and other characteristics denoting a new holostean described as *Paraliodesmus guadagnii* gen. et sp. nov.

### INTRODUCTION

There is a meagerness of published information about the diminutive members of the paleoichthyological faunas of the classic Upper Cretaceous formations of North America, coupled with a lack of demonstrable systematic diversity among these forms. This is quite evident when comparison is made with records from equivalent strata in other parts of the world.

Prompted by the mode of occurrence of *Leptecodon* (Stewart, 1900) and *Kansius* (Hussakof, 1929) which are preserved in the interiors of the shells of *Inoceramus grandis* (Conrad), this writer and G. Donald Guadagni made routine examination of eroding specimens of this pelecypod while collecting in the Niobrara Formation of western Kansas during the summer of 1954. The result of the search was recovery of numerous additional specimens of the small berycoid *Kansius* as well as one unfamiliar skeleton of modest size. Although incomplete, the latter specimen possesses an abbreviated heterocercal caudal appendage, scales of rounded amioid type and other characteristics here interpreted as denoting a previously unknown fish of holostean affinity. It is suggested that future search of this sort might well add appreciably to knowledge of a little-known faunal segment of the Kansas "Chalk".



I am indebted to the Smithsonian Institution for the privilege of making this study. Dr. Colin Patterson of the British Museum [Natural History], London and Dr. Richard Lund of the Carnegie Museum, Pittsburgh, were gracious in making pertinent comparative materials available for examination. The illustrations represent the work of two members of the staff of the United States National Museum: Lawrence B. Isham prepared the drawings and Jack Scott made the photographs.

## SYSTEMATIC PALEONTOLOGY

Order AMIIFORMES Hay, 1929

Suborder AMIOIDEI Schlosser, 1934

Family ?CATURIDAE Koken, 1911

Genus **PARALIODESMUS** gen. nov.

**PARALIODESMUS GUADAGNII**<sup>1</sup> sp. nov.

Pl. 1, figs. 1-3

*Diagnosis for genus and species:* An actinopterygian fish of holostean affinity which differs from any of the more comparable members of the families Caturidae and Amiidae in the following combination of characteristics: Dermal bones of the skull exceptionally thick and with a noticeably coarse rugose ornamentation; notochord persistent; dorsal fin originating remotely behind the pelvics and largely opposed to a long-based anal; caudal fin equilobate, deeply cleft and of apparent caturid internal structure; fins without evidence of fulcra except for spinelets of accumulative length in advance of both upper and lower lobes of the caudal fin; scales minute and of rounded amioid type.

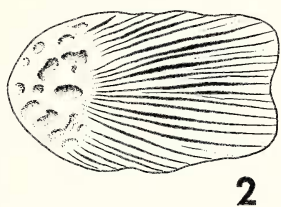
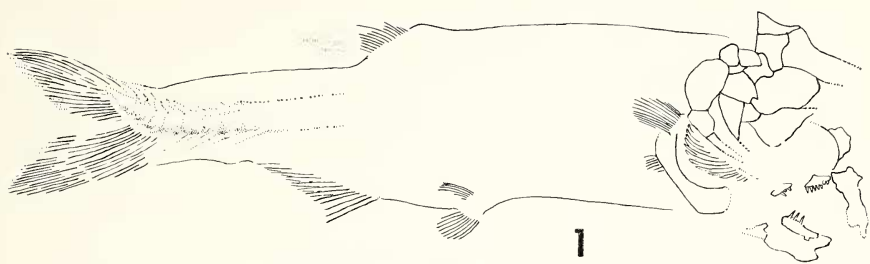
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<sup>1</sup> Named in honor of Mr. G. Donald Guadagni, codiscoverer of the holotype.

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### EXPLANATION OF PLATE 1

Figs. 1-3. *Paraliodesmus guadagnii* Dunkle, holotype, U. S. N. M. 21083.  
1. Habit sketch of specimen,  $\times \frac{2}{3}$ ; 2. Sketch of rounded scale,  $\times 18$  (approx.);  
3. Photograph of specimen,  $\times \frac{2}{3}$ .



*Holotype*: United States National Museum no. 21083, a fish preserved in part as an impression.

*Horizon and locality*: Smoky Hill Member of the Niobrara Formation (Upper Cretaceous) in sec. 36, T. 15 S., R. 31 W., Gove County, Kansas.

## DESCRIPTION

Post-depositional compression of the *Inoceramus* valves with consequent comminution of the enclosed skeleton and subsequent exposure of the anterior half of the body has largely obliterated fine structural detail. Clearly observable, however, is the outline of an entire fish shown by (1) an impression of the left anterior side of the body on the internal surface of the lower shell and (2) the right aspect of preserved posterior scales, fins and axial structure which were protected prior to discovery by portions of the upper shell that had remained in place during weathering. An elongate fusiform fish is indicated with a maximum body depth of 35 mm, a stout caudal pedicle of 15 mm depth, and head and opercular apparatus occupying 40 mm of a total overall length approaching 170 mm.

The head is obliquely crushed and is seen in ventrolateral aspect. Only remnants of the skull bones remain but these are of remarkable thickness, with coarse and radiating rugose ornamentation. Whether or not an external covering of enamel is retained on the cranial elements and scales has not been definitely ascertained, but its presence is suspected. The suspensorium would appear to have been vertical and the mouth terminal, with wide gape. The premaxillaries are in contact with each other mesially and are succeeded dorsally in the snout by a reduced rostral bone which is broader in front than long. Preserved fragments of the right maxillary show an elongate element, somewhat deepened behind, with a straight oral border. The separate bones of the mandibles cannot be discerned. However, the dentary portion is relatively low anteriorly, progressively deepening to a coronary eminence posteriorly. These visceral elements all bear a single labial row of robust teeth. Those of the upper jaw are particularly stout and strongly recurved. Dentary teeth are, in comparison, high, thin and styliform. Part of a presumed splenial exposed beneath one of the lower jaws displays a random arrangement of minute denticles.

The number and arrangement of the opercular bones are characteristic of the amioid fishes. The operculum is slightly the larger element of the series with rounded posterior margin and anteroventral notch receiving an ascending process of the suboperculum. The branchiostegal rays, in typical fanned pattern, are narrow and numerous.

The notochord is persistent to its tip in the epichordal lobe of the equilobate and noticeably notched caudal fin. The downcrushing of scales over the expanded proximal processes of opposing neural and haemal arches vaguely suggests segmentation of the notochordal axis posteriorly, but no evidence of central ossifications can be detected. If indeed such are present under the scale cover, they must be very weak. Neural and haemal structures are acutely recumbent upon the notochord throughout the caudal region. The development of the posterior haemal spines is poorly visible. While somewhat expanded, none that can be seen appears larger than another. Nevertheless there is a definite overlap of the clustered and forked proximal ends of the principal rays of the upper lobe of the caudal fin across several of the posterior uptilted hypural bones as in *Caturus* (Lund, 1967).

The dorsal fin appears to have been about as long as high and originates well behind the midlength of the specimen, posterior to the plane of the pelvic fins and only slightly anterior to the origin of the lower, longer-based anal.

The position of the pectoral fins has been distorted by the oblique crushing of the head. It seems probable, however, that they were somewhat elevated on the sides of the body. They are indicated to have been larger than the pelvics. The separation of the paired fins is about twice the distance between the pelvics and the anal fin.

The forward edges of the upper and lower lobes of the caudal fin display a number of undivided rays of posteriorly accumulative length. These may also be present on the other fins, but evidence of fulcral scales of more typical chondrosteian or semionotoid form is absent.

Scales of this fish are rounded, narrower apically than basally, and only about 2 mm in length. The center of growth and exposed portion of the scale, as marked externally by a few tubercles and coarse, radiate rugae, is far apical and very short. The basal covered portion of each is of much greater area and displays fine, more

or less parallel striae which radiate to the upper, lower and anterior margins of the scales.

## DISCUSSION

Known Cretaceous fishes of holostean stock are relatively few in number. Among these, *Paraliodesmus* shows greater similarity only to representatives of the families Caturidae and Amiidae. It is distinguished from the essentially contemporaneous *Lophiostomus* and *Neorhombolepis* (Woodward, 1895), and *Enneles* (Santos, 1960) by scale type and size. Closer comparability of the characters elucidated are in fact seen with the older and better known Jurassic genera *Caturus* and *Liodesmus*. It differs most obviously from the latter two in fin position and the thickness and coarse ornamentation of the skull bones. Caudal structure suggests tentative reference of *Paraliodesmus* to the family Caturidae rather than to Amiidae. Such assignment necessitates assumption that the absence of fulcra occurred independently in a number of phyletic lines, as did the rounding and reduction of the scales (Schultze, 1966).

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